

DESCRIPTION OF IMMATURE STAGES OF *PLATYVELIA BRACHIALIS*
(STÅL) (HETEROPTERA: VELIIDAE)

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Abstract.—The five immature instars of the broad-shouldered waterstrider, *Platyvelia brachialis*, are described for the first time. Of three characters considered diagnostic for adult *Platyvelia* only one, patches of silvery setae on the abdominal dorsum, was observed on immatures of *P. brachialis*.

Key Words: Broad-shouldered waterstriders, *Platyvelia brachialis*, Veliidae, Heteroptera, immature insects

During a collecting trip to northeastern North Carolina in August 1994, the two senior authors collected a complete series of immature instars for the veliid species *Platyvelia brachialis* (Stål). We here provide the first description of the five immature instars of this species. Readers wishing to learn more about the adults of *Platyvelia brachialis* should consult Polhemus and Polhemus (1993) and the references therein. Excellent, more general treatments of veliids can be found in Andersen (1982), Smith (1988), and Schuh and Slater (1995).

The veliids would then walk out onto the water, away from the banks, at which time they were easily collected from the water surface with an aspirator. In addition to the immatures described below, 27 adult males and 24 adult females were collected. All the adults were macropterous.

Descriptions were based on 3 first, 4 second, 5 third, 6 fourth, and 4 fifth instar specimens. Dorsal habitus illustrations were produced using a camera lucida mounted on a Zeiss Stemi SV6 stereomicroscope.

Voucher specimens have been deposited in the first author's private collection.

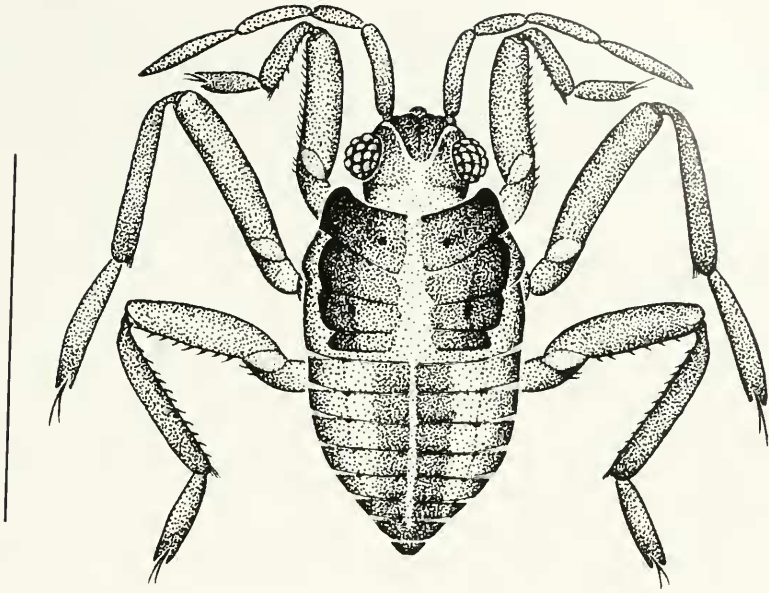
MATERIALS AND METHODS

Specimens were collected along the banks of stagnant bodies of water at the following localities in northeastern North Carolina: Washington Co., Thirty Foot Canal, near junction of Thirty Foot Canal Rd. and Tom Pepper Rd., 12, 13 August 1994; Washington Co., ca. 1 km. E. of Creshell near junction of Old Cherry Rd. and Springhill Rd., 12 August 1994; Tyrell Co., Batavia Canal, ca. 2 km N. of Lake Phelps, 13 August 1994. They were collected by disturbing the vegetation along the banks.

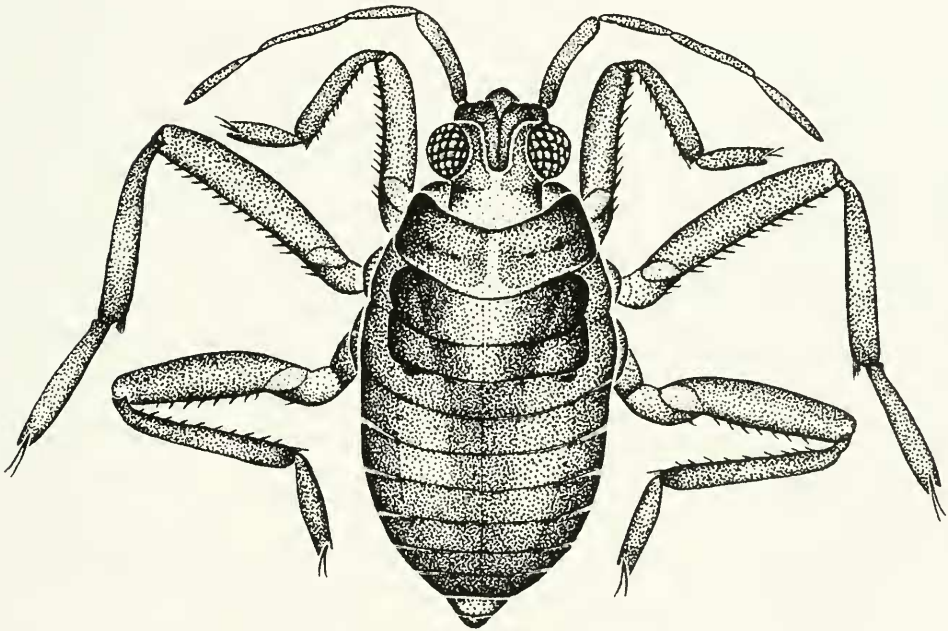
DESCRIPTIONS

First instar (Fig. 1).—Length, 1.25 mm \pm 0.09 mm; width, 0.61 mm \pm 0.03 mm. Body elongate and elliptical, greatest width at mesothorax; general ground color ochreous; covered with dense, short setae.

Head declivent, dorsally brown, ventrally ochreous, vertex with dark median stripe; anteclypeus protruding, rounded anteriorly; remainder of head excluding eyes subrectangular; ecdysial lines ochreous, Y-shaped, stem wider than arms, arising from poste-



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Figs. 1-2. *Platyvelia brachialis*. 1. First instar. 2. Second instar. Scale bar = 1 mm.

rior margin of head, arms extending to anteroinferior margin of eyes. Eyes globose, red, separated by ca. $1.6\times$ width of eyes; ocular setae absent. 3 pairs of trichobothria present, 1st pair just posterior to anteclypeus, 2nd pair posterolateral to 1st pair, 3rd pair just medial to inner margin of eyes. Antenna 4-segmented, brown with segments 1 and 2 darker than 3 and 4; segment 1 curved, segment 2 shortest, segment 4 longest and tapered apically. Beak 4-segmented, segments 1–3 ochreous, 4 brown; segment 2 shortest, segment 3 longest, segments 1 and 4 subequal.

Thoracic nota each with pair of sclerotized, brown subrectangular plates covering most of dorsum, each wider laterally, separated medially by an ochreous ecdysial membrane which widens posteriorly; pronotal plates extending further laterally than meso- and metanota, mesonota extend only slightly further laterally than metanota. Dark fovea present on each pronotal plate roughly in line with anteromedial corner of eye; shallow oblique depression lateral to fovea extending anterolaterally. Meso- and metanota with dark longitudinal markings in line with posteromedial corner of eyes. Thoracic pleura and sterna ochreous, membranous; supracoxal lobes sclerotized and pigmented brown.

Legs brownish dorsally, ochreous ventrally, setose throughout; mesothoracic leg longest. Prothoracic leg somewhat raptorial; coxa globose distally, subequal in length to trochanter; trochanter ventral margin longer than dorsal, subequal in length to tarsus, 5–7 spines on ventral surface distally; femur slightly curved, ochreous at distal tip, ca. $1\frac{1}{3}\times$ longer than tibia, proximal $\frac{3}{4}$ of ventral margin with double row of spines; tibia slightly curved, row of short, thick spines anteroventrally, longer, thinner spines posteroventrally, tuft of hairs anterodistally, grooming comb distally and posteroventral; tarsi straight, 1-segmented, subequal in length to trochanter, short, paired claws subapical. Mesothoracic coxa globose distally, subequal in length to trochanter; tro-

chanter without ventral spines, ca. $\frac{1}{2}$ length of tarsus; femur slightly curved, ochreous at distal tip, double row of spines absent, subequal to slightly longer than tibia; tibia straight, ventral spines absent, anterodistal hair tuft present but less dense than on protibia, grooming comb present; tarsus straight, ca. $\frac{3}{4}$ length of tibia, subapical claw slender, longer than protarsal claw. Metathoracic coxa elongate, subrectangular, constricted proximally but not rounded distally, shorter than trochanter; trochanter without ventral spines, subequal in length to tarsus; femur slightly curved, ochreous at distal tip, subequal to slightly longer than tibia, single row of 4–6 short, thick spines ventral; tibia straight, single row of 13–15 thin recurved spines on ventral surface, anterodistal hair tuft absent, grooming comb present, tarsus straight, ca. $\frac{1}{2}$ length of tibia, subapical claw similar to mesotarsal claw.

Abdomen ochreous. Tergum 1 with pair of rectangular mediotergites widely separated by medial ecdysial membrane, laterotergites absent. Terga 2–8 with pair of rectangular mediotergites, lateral margins slightly lateral to medial margins of 1st mediotergites, narrowly separated by medial ecdysial membrane; two pairs of laterotergites present, the first small, narrowly and irregularly elliptical, found on anterior margin of segments, the second minute, located intrasegmentally, distal to first, both absent on segment 8; distance between medio- and laterotergites decreases posteriorly. Spiracles present dorsally on segment 1, laterally on segments 2–7. Minute pleurites present on segments 2–7. Venter mostly membranous, pair of sclerites present medially on segment 8. Segment 9 cone-shaped, sclerotized dorsally and laterally. Segment 10 only visible ventrally, enclosed dorsally and laterally by segment 9.

Second instar (Fig. 2).—Length, 1.70 mm \pm 0.05 mm; width, 0.74 mm \pm 0.04 mm.

Ground color slightly darker than first. Antennal tubercles more distinct.

Pair of dark foveae present on each pro-

notal plate, medial fovea in line with anteromedial margin of eye, lateral fovea present in medial end of oblique depression, in line with lateral margin of base of antennae, area between foveae of each plate slightly depressed. Meso- and metanotal plates with dark, narrowly U-shaped longitudinal markings in middle, open anteriorly.

Ventral surface of legs brownish. Prothoracic femur ca. $1.4\times$ length of tibia; faint yellow band in distal $\frac{1}{3}$. Tibia with faint ochreous band in middle third. Mesothoracic trochanter with pair of denticles on distoventral aspect. Femur with faint yellow band in distal third. Tibia with faint ochreous band in middle third; double row of spines present, shorter and fewer than that of profemur. Tarsus ca. $0.8\times$ length of tibia. Metathoracic trochanter with 3–4 short spines on distoventral aspect. Femur with double row of 7–9 ventral spines, dorsal row longer, more robust; faint yellow band in distal half. Tibia with faint ochreous band in middle $\frac{1}{4}$.

Abdominal mediotergites of segment 1 lightly pigmented, subrectangular, narrowly separated by ecdysal line; mediotergites of segments 2–8 greatly reduced, taking on an irregular elliptical shape, located anteriorly along intersegmental fold; all mediotergites forming a parallel row in line with the medial prothoracic foveae. Laterotergites present on segment 1 as small elliptical disks along intersegmental membrane with metathorax. Segment 9 with ecdysial line.

Otherwise similar to first instar.

Third instar (Fig. 3).—Length, 2.10 mm \pm 0.16 mm; width, 0.95 mm \pm 0.04 mm.

Ground color darker. Eyes separated by ca. $1.2\times$ width of eye. Antennal segment 1 subequal to segment 4.

Posterior margin of pronotum extends posterior at midline. Lateral foveae in line with posteromedial margin of eyes. Mesonotal wing pads present, extending posteriorly ca. $\frac{1}{2}$ length of metanotum. Metanotal wing pads extend ca. $\frac{1}{2}$ length of first abdominal segment.

Leg bands more distinct; proximal $\frac{1}{2}$ of

tarsi ochreous. Prothoracic trochanter with 8–12 spines on distoventral surface; femur ca. $1.6\times$ longer than tibia, spines extend nearly length of ventral surface. Mesothoracic tarsus ca. $0.7\times$ length of tibia. Metathoracic femur with double row of 9–11 short, thin spines; femur slightly longer than tibia.

Sternite on abdominal segment 8 heavily setose.

Otherwise similar to second instar.

Fourth instar (Fig. 4).—Length, 3.04 mm \pm 0.18 mm; width 1.13 mm \pm 0.10 mm.

Body more elongate, greatest width at metathorax. Ground color darker. Eyes separated by ca. $1.6\times$ width of eyes. First antennal segment ca. $1.4\times$ length of fourth segment; darker in proximal $\frac{1}{3}$. Second antennal segment with faint yellow band in proximal $\frac{1}{2}$.

Mesothoracic wing pad nearly extends to posterior border of metanotum; metathoracic wing pad nearly extends to posterior border of first abdominal segment.

Mesothoracic tarsus ca. $0.6\times$ length of tibia. Metathoracic tarsus ca. $0.4\times$ length of tibia.

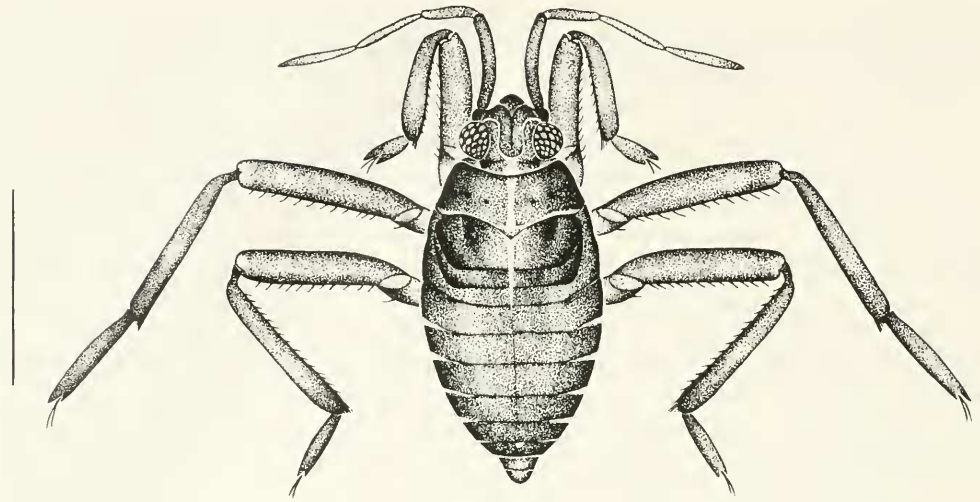
Thin patch of silvery pubescence present on distolateral margins of abdominal segments 2–7; ecdysal line forming ovate patch at anterior margin of segment 7, a smaller pair of ochreous spots lateral to ecdysal patch between the medio- and lateral tergites. Medial $\frac{1}{2}$ of dorsal surface segment 8 ochreous; sexual differentiation apparent on ventral sternite of segment 8

Otherwise similar to third instar.

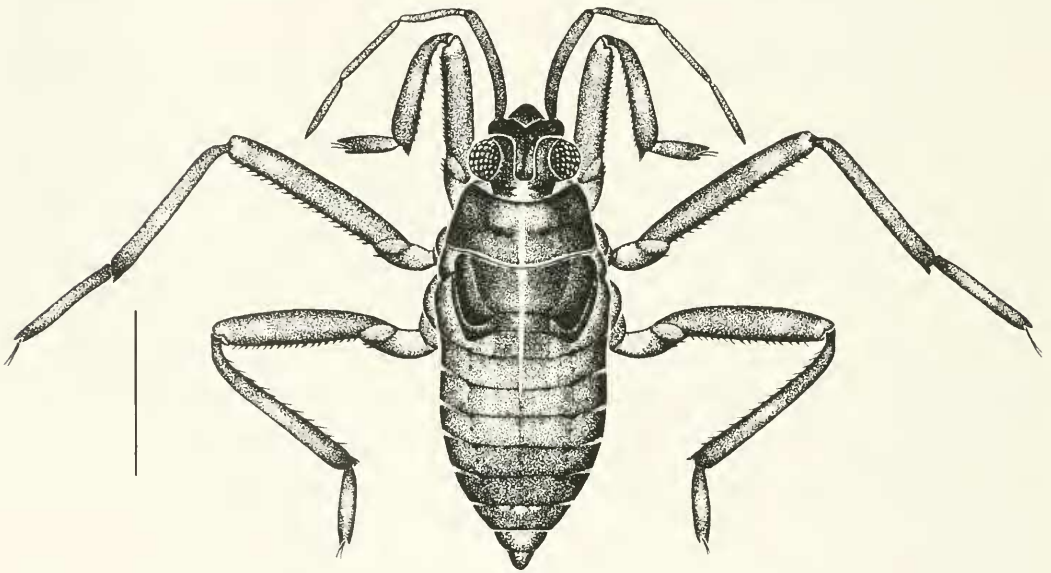
Fifth instar (Fig. 5).—Length, 4.16 mm \pm 0.23 mm; width, 1.48 mm, \pm 0.10 mm.

Ground color darker, patterns more distinct. Antennal tubercles more distinct, nearly black; anteclypeus, postclypeus, and posterior margin of head nearly black. Eyes separated by $1.4\times$ width of eyes. First antennal segment ca. $1.6\times$ length of segment 4; segments 2 and 3 subequal.

Pronotum with dark brown markings extending anterolaterally from lateral foveae to anterior margin of pronotum and poste-



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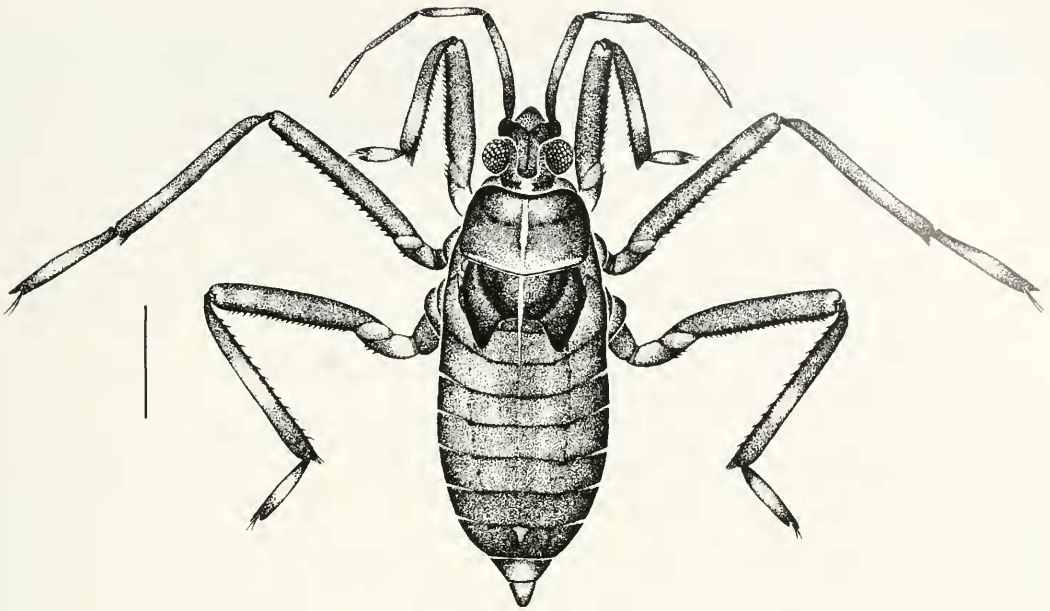
Figs. 3-4. *Platyvelia brachialis*. 3, Third instar. 4, Fourth instar. Scale bar = 1 mm.

riorly $\frac{2}{3}$ the length of the lateral margin. Posterior $\frac{1}{3}$ raised, quadrate and widened laterally. Midline elevated, reaching highest point at posterior margin.

Wing pad darker, more developed. Mesonotal pad with a broad, setose, semilunar elevation in medial $\frac{3}{4}$; pads extend poste-

riorly ca. $\frac{3}{4}$ length of abdominal segment 1, nearly covering metanotal pad. Distal tip of metanotal pad curved laterally, extending just distal to mesonotal pad.

Prothoracic femur ca. $1.2\times$ length of tibia. Tibia ca. $2.5\times$ length of tarsi, yellow band on posterior of proximal $\frac{1}{4}$; anterior



5

Fig. 5. *Platyvelia brachialis*, fifth instar. Scale bar = 1 mm.

surface yellow. Mesothoracic tibia with yellow band on posterior of proximal $\frac{1}{4}$; anterior surface yellow. Metathoracic tibia ca. $4.3\times$ length of metatarsus; yellow band in proximal $\frac{1}{4}$.

Pubescence present along distolateral margins of abdominal segments 2–7 more distinct; additional pubescence present in random patterns along dorsal surface of segments 3–7. Segment 7 with dark yellow ovate spot present along anterior portion of ecdysal line. Segment 8 with anterior margin dark yellow, expanding along ecdysal line posteriorly; ventral aspect completely covered by sternites. Segment 9 usually with most of dorsal surface yellow.

Otherwise similar to fourth instar.

DISCUSSION

Polhemus and Polhemus (1993) list three apomorphies for the genus *Platyvelia*. The first, opposing metasternal and mesoacetaular tubercles, are not present on immature specimens of *P. brachialis*. This is therefore an adult character. The second apo-

morphy, silvery setae on the abdominal dorsal surface (and on the hemelytra of winged adults), begins in the 4th instar, but only as small intersegmental areas between segments 2–7. Larger areas of silvery setae appear on the dorsal abdominal surface of instar 5, but these are not present in a distinct pattern. The final apomorphy is the lack of ocular setae, a trait shared with *Steinovelia*. We found no evidence of ocular setae in any instar. Thus, of three characters considered diagnostic for adult *Platyvelia* only one, patches of silvery setae on the abdominal dorsum, was observed on immatures of *P. brachialis*.

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